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Sustainable Urban Development and Issues Dominating Design of Bike Lanes (Focusing Hamedan of Iran)

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ABSTRACT: Nowadays with the increasing importance of issues such as sustainable development, and green transportation, using bicycles as a means of transport for urban dwellers is very important and inevitable .Therefore, it has become necessary to design and build a safe, connected, and comfortable network of the bike lane to achieve urban sustainable development. It is noteworthy that environment, natural resources and energy conservation, are under the influence of urban transportation and the issues related. But given the cost and difficulty of designing a new bike path and new nature of the subject, it is observed that establishing bike path has confronted with numerous obstacles in our country. In this paper, we describe a descriptive-analytic method – focusing the field and library studies- and explain standards for bicycle path design towards sustainable development, while investigating obstacles and problem of design and management of bike paths in Boulevard Eram Hamedan.

Keywords: Transportation Environment, Design Requirements, Comfortable And Easy Path, Standard, Path Continuity

ORIGINAL ARTICLE

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INTRODUCTION

Sustainable development is one of the most challenging issues in today's world. We strive to control greenhouse gas emissions to meet the challenges of climate change as international and common concerns people have. The 70`s can be regarded as the decade of awareness from environmental crises which brought about different reactions in the world, the most important of which is sustainable development (Mokhtari, 2011).

Based on the available per capita green gas, emissions of developing countries are now much lower than those in developed countries, but developing countries are modeled in their economic infrastructure from their industrial counterparts.

Today's economic activity in developing countries around the world, particularly in the Pacific ocean countries is much greater than it used to be two or three decades ago, each year. These countries increase their share of the world economy.

Forecasts suggest that many developing countries will emit, more greenhouse gases than developed countries in the next two or three decades .Increased energy consumption and indiscriminate use of fossil fuels, produce a variety of pollutants and greenhouse gases and environmental impacts such as pollution of water, soil and air

Today, activities of transportation, commuting and communications have had many changes in such a way that modern man has been involved in many problems

Due to the development of automobiles and motor vehicles, the development of suburban and inner-city streets has been made regardless of the conditions and criteria by humans which over time has created complex problems in a transportation network, especially in urban centers

One of the strategies that have been implemented in countries is creating bicycle paths that could have a significant role in solving the problems.In this paper, we become familiar with the basic concepts of sustainability and explain the principles governing the design of bike lanes and bike routes .Finally, the barriers and problems in the design and management of Hamadan Eram Boulevard will be reviewed.

Sustainable development

The term sustainability was introduced for the first time in 1986 by the International Commission on Environmental Development entitled meeting the needs of the present era without compromising the resources of future generations.

"Sustainable development can be regarded as the result of the growing logical awareness of global issues of the environment that is influenced by environmental factors such as the environmental movements of sixties, publishing books such as growth restrictions, and the first United Nations Conference on Environment and development which was held in 1972 in Stockholm, Sweden" (Azarbayejani, 2003).

Sustainable development has profound implications in three fields: 1) Environmental Sustainability, 2) Economic sustainability, 3) Social sustainability (Kiyoumarsi, 2001). In order to fulfill the objectives of sustainable development, environmental sustainability is more important in relation to transport

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and environmental issues that threaten the future of humanity have led the humans to find the remedy.

Environmental sustainability and sustainable development: Environmental sustainability can be defined as follows: Protecting the Earth for future generations in the best way possible. With this definition, human activity is stable when it can be implemented without reducing or declining the quality and quantity of natural resources. Environmental sustainability, aimed at conserving the environment, will focus on the following (Mahmoodi, 2005):

- Reducing energy loss in the environment
- Reducing production which influences environment and human health.
- Using materials reversible into the cycle of nature.
- Eliminate toxic substances

Environmental sustainability in the field of transport can be explained with the following objectives:

- Less consumption of energy resources
- Using materials, matters and renewable energy
- Protecting from materials and recycling materials without causing pollution.

Principles of sustainable design: Although hardly are principles stated for inclusive sustainable design, in the field of design and environmental issues that are associated with humans, we can use the following principles: An understanding of the design environment: undoubtedly, lack of necessary knowledge of design environment leads to destruction of the environment. Understanding the natural processes; the sustainable design will be merged in the cycles of nature and the nature mechanism does not interfere with it. Recognition of people; sustainable design must pay attention to a wide range of cultures, generations, religions and habits of the people who apply it or are living in it and to consider natural and logical needs of the community.

Design of bike lanes and sustainable development: Designing bike lanes and considering the necessary standards according to parameters in the context of urban and suburban environments and cultural programming regarding growth rate of transport generally can reduce a lot of traffic and traffic problems along with negative social and economic consequences. Also, air pollution and the incidence of diseases due to the use of fossil fuels in motor vehicles which are caused by fossil fuels will be less significant. Meanwhile, it should also be noted that use of bicycles and bike lanes will not be spending a lot of costs to city managers and users and can be used to meet the social and economic needs of transportation system. Therefore, design, implementation and management of bicycle paths can be in line with the principles of sustainable urban development to help growth of Sustainability parameters in the area of environmental sustainability, economic sustainability and social sustainability.

Bike paths

Types of bike lanes: According to site facilities of design and terms of use, scale, scope, context, objectives, background, prospective and policies that planner considers, different types of bike paths are designed.

Specific paths: These pathways are generated independent of the other motor vehicle paths and simply for bicycle traffic. Their widths is usually between 2.4 to 3.6 m and are generally designed in recreational areas, parks and areas outside the city free from spatial limitations where there is possibility of traffic separation (Fig. 1).

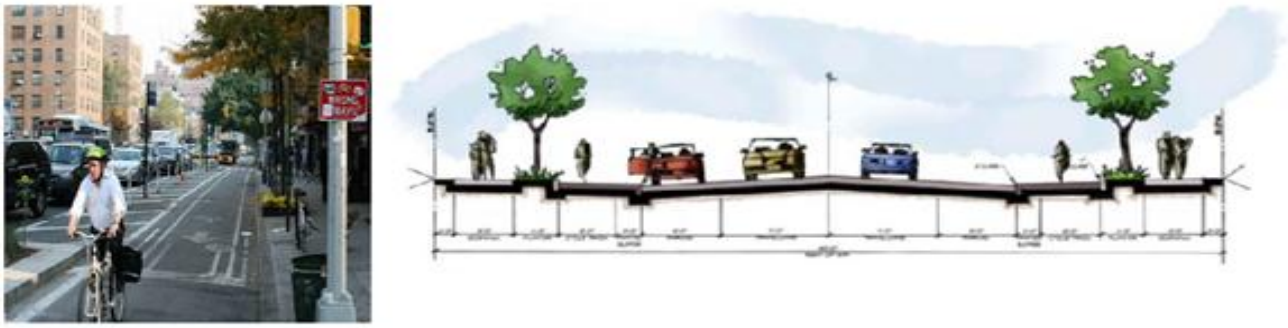

Figure 1. Specific paths

Special or semi-exclusive lanes: In the presence of a low-traffic and spatial limitations of path, bicycle path is considered. These paths will be constructed adjacent to and parallel to the roadway and are separated by physical barriers (King, 2002). Width of these general barriers varies between 1.5 to 1.8 m.

Mixed or lateral directions; This type of bike paths is designed for the mixed traffic of bicycles and motor vehicles with the width varying usually between 2.4 to 2.6 m. These paths are identified through the floor boards and warning signs (Fig. 2).

Figure 2. Special or semi-exclusive lanes

Pedestrian and bicycle shared paths: In cases where traffic of street cars is heavier than practical capacity of street, or the width of motorists' strip denies access for cyclists or reduction of the roadway width is not possible, shared use of pedestrian and cyclist occurs while we must pay attention that traffic volume must be sufficient compared with allocated space (Fig. 3). Within these passages, the widths are usually between 1.5 to 1.8 m (Taghvaee, 2010).

Design requirements for bicycle paths: Discussing the design of bike paths in the country is very new; so far, unfortunately, standards, regulations and instructions have not been prepared in this area. Therefore, in this paper a number of domestic researches and foreign standards and researches are cited.

Path safety: The most important thing in planning related with bike lanes is biker safety (Shahabian, 2003).It is necessary to consider safety measures when designing and building bike paths in the city (Jensen, 2006). In addition to protect cyclists and pedestrians, safety measures will create joy and attraction for cyclists.

Interference of bike lanes and motor vehicles should be avoided as much as possible and within the scope of high bike traffic, speed of motor vehicles should be kept as low as possible (Fig. 4).

Path must have "slick and smooth surface without any lumps or depressions in order to prevent injury to the rider or to make sudden changes in direction. (Fig. 5)

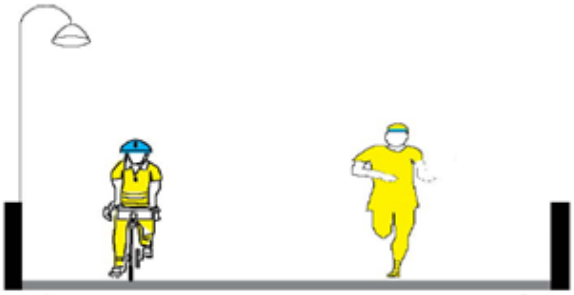

Figure 3. The shared path

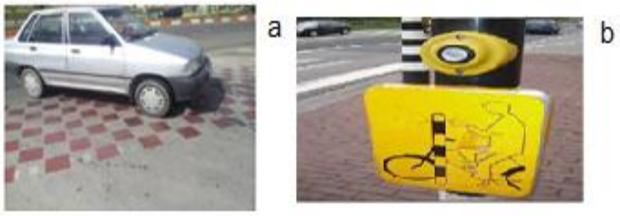

Figure 4. Interference of bike lanes and motor vehicles, a) Hamadan b) Use of new technologies

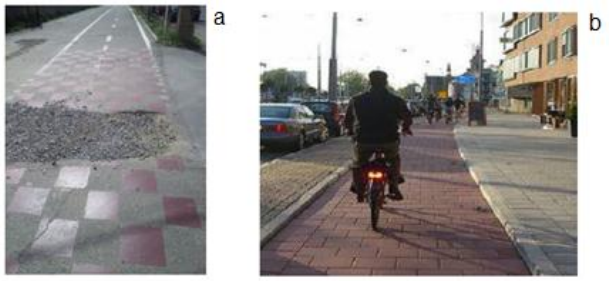

Figure 5. Difference between slick and smooth surface in any country a) Hamadan b) Optimal sample

Comfortable and easy path: Ease of way help the community groups who have limited physical abilities to use it (Shahabian, 2003). Unfortunately, the bikes used in the study lacked the necessary springs making the bicyclists upset. The path slope rate, short paths of high slope, straight and strong flooring, lighting and weather conditions are among the factors to deal effectively with that cause more comfort. The main focus of this section is that bikes can be used in conjunction with the convenient public transportation. Taking the bike on the bus, subway, tram and other public transport should be prioritized in traffic synchronization plan (James, 2006). This point was not observed in Hamadan and the path under the study (Fig. 6).

Figure 6. Carrying bicycles in public transport vehicles

The path continuity: Continuity of bicycle path in linking the different land uses within the city is very important which did not happen in the city of Hamadan (Fig. 7) and the comprehensive plan should consider it. In the design of the network, the whole city must be related by a dense network of bike trajectories to residential, business, shopping and leisure places (Garib, 2008; Kanafolakhar, 2010). The integrated bicycle network that connects the sources to all destinations and the facilities and equipment necessary for the vehicle change (for example bike parking stations in the bus terminals) is considered (Fig. 8) to be the main component of the development of cycling in cities (Development, 1996).

Figure 7. Discontinuity of a bicycle path in Hamedan

Figure 8. Bicycle Parking

Appropriate notification system: Bike lanes should have adequate access to telephone booths for demanding bicycle repair services, if necessary, dispatching an ambulance when it is called for (Kanafolakhar, 2010).

Compliance with design standards: Compliance with design standards such as the width of the paths based on studies and the principles of the arch design and etc. that also suffers from serious weaknesses.

Standard and secure parking lots: Creating standard and secure parking lots along the bike path, especially in the rest places is one of the components of bike path which has not been anticipated in the path under the study.

Warning signs and boards: Warning signs and boards with the standards for color, size, position and angle of placement and aesthetic issues (Fig. 9) in all directions and warning signs at night (Fig. 10) are critical points that should be of great interest.

Figure 9. Neglecting aesthetic issues in placement of warning signs in Hamadan

Figure 10. Good night lighting

CONCLUSION

It can be inferred from the points explained above that:

- •sustainable design is not style or school of thought but a requirement and a necessity in modern life which should be considered as a loophole
- •sustainable development and therefore sustainable design have certain principles that all fields must be adhered to.
- •design and implementation of urban bike lanes increases coefficient of sustainable development.
- Hamadan bike path study in that designers and implementers are still in its infancy and the need to design, manage, maintain and improve the culture is strongly felt in this regard.

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